

Zero Retries issue 0005 2021-08-13

*Advanced Amateur Radio - Data Communications; Space; Microwave... the fun stuff!
Nothing great has ever been accomplished without irrational exuberance. - [Tom Evslin](#).*

Steve Stroh N8GNJ, Editor

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Modernizing Amateur Radio Regulations

By Steve Lampreur KB9MWR

*Editor's Note - As KB9MWR mentions, I put him up to this article, which he first published on his thought-provoking blog [Advancing Ham Radio.. different ideas](#). It's a must-read for me and near the top of my RSS feed. Steve's "think **differently**, think **passionately**, let's **advance** Amateur Radio" ethos was the inspiration for my [SuperPacket.org](#) blog, and a significant influence in starting Zero Retries. It's lonely floating one's ideas that might not be popular... or find an audience in your corner of the world. Steve is a deep thinker about issues such as this that are within the scope of Zero Retries. I'm grateful to Steve that he gave me permission to run [his article](#) here. I've lightly formatted Steve's article for publication in Zero Retries.*

[Steve, N8GNJ](#) asked me to consolidate my top five or so regulatory changes that I think are required to modernize US Amateur Radio. What I am about to present isn't new. Bruce, K6BP wrote a well thought and researched overview in 2017 in [response](#) to a Technological Advisory

Council (TAC) on reforming technical regulations across all FCC radio services.

Several of the personal radio service rules (Part 95) were subsequently.

- <https://www.radioworld.com/news-and-business/business-and-law/fcc-to-consider-changes-to-part-95-rules>
- <http://www.arrl.org/news/fcc-personal-radio-service-revisions-will-affect-gmrs-frs-cb-other-part-95-device>

And some are still in motion:

- <https://docs.fcc.gov/public/attachments/DOC-374114A1.pdf>

Meanwhile there are a number of ham radio requests, some even from the ARRL that have gone nowhere (Symbol Rate Petition of 2013, and the 2018 Technician Enhancement Proposal). And as Bruce pointed out most of our regulations have been unchanged for 65 years or more.

So here we go. Our Basis and Purpose MUST be freshened up to reflect the educational benefits and purposes for continued justification of spectrum allocation to the Amateur Service. Our emergency services role continues to diminish (with the advent of [FirstNet](#) and [Starlink](#)) and the other currently-stated missions of Amateur Radio have already reached irrelevance.

Examples:

- Bruce pointed out the context of “enhance international goodwill” was written before direct dialing of long distance calls (transatlantic telephone cables). So, Radio Amateurs were the only people who regularly had casual conversations with people overseas.
- [Bruce] also pointed out that the word “reservoir” is critical to understanding this statement: *“Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.”* The U.S. was at war in Korea as this statement was written, and World War II had concluded less than a decade before. The military had a need for a reservoir of trained radiotelegraph operators who could go to war.
- Bruce pointed out the word “education” doesn’t appear in §97.1, and there is no tie-in to the oft-promoted need to educate young citizens in STEM (Science, Technology, Engineering, Mathematics).

This second part is my own hot button topic since data is my forte.

“§97.305 through §97.309 spell out a limited set of modes, modulations, and digital data codes which Radio Amateurs can use on the air. They date back to the analog age, and limit innovation because they do not permit the use of modern modes and modulations in the Amateur Service.”

I've written before on how I feel it's just plain silly that we classify our transmissions by how we use them (what we convey) and that defines what rules apply. i.e Digital voice modes, while all ones and zeros don't fall under the data rules, they fall under the voice rules. I've also harped about how the fast scan amateur television rules let video modes occupy 6 MHz or more

(actually no bandwidth limit), while data is limited to 100 KHz.

And it's dumber than just all that. Now that FreeDV is starting to become more common on HF, it's classified as a voice mode since that is what is being conveyed. So it's required to be in the voice segments, not the data, [segment], etc.

Regulation based on the bandwidth of the transmission, rather than the modulation type and mode is overdue folks. It's the only thing that makes any sense. I'm partial to the 2.8 kHz below 30 MHz proposal, and no maximum bandwidth or data rates above 30 MHz.

Whatever you wish for please keep in mind that it's almost next to impossible to get the FCC to change anything for Part 97 and takes decades to do so. We'd be best off with as few rules as possible and just implementing more gentlemen's agreements. It's not like the FCC does any active enforcement anyway.

I will continue the discussion KB9MWR began in Zero Retries 0008.

ARRL 2020 Report

By Steve Stroh N8GNJ

The ARRL has released its [Annual Report for 2020](#). Here are some impressions.

- At EOY 2020, the US Amateur Radio population is 771,688, and ARRL membership is 158,494. In 2021, ~80% of US Amateur Radio operators see no compelling reason to be a member of ARRL.
- ARRL dues (magazine subscription) are unchanged from \$50/year, even if you opt out of paper magazine delivery.
- While it's laudable that ARRL debuted a new bimonthly magazine for new Amateur Radio Operators - **On The Air** (OTA), and they made electronic versions of QST, OTA, National Contest Journal (NCJ) and QEX available to all *members* at no additional cost... ARRL did little to get over that \$50 / year hurdle to new Amateur Radio Operators to access the content of OTA and QST.
- It's notable that ARRL has not done a Strengths, Weaknesses, Opportunities, and Threats (SWOT) exercise within its membership and released the results. The Radio Society of Great Britain (RSGB) [recently did a SWOT exercise with 1000 of its members](#) (PDF). *RSGB's SWOT exercise is the topic of a future ZR article.*
- Hiram Percy Maxim made his obligatory appearance, despite having no relevance to Amateur Radio in 2020.

ARDC Technical Advisory Committee (TAC) Proposal (the *other* ARDC)

In my previous articles about [Amateur Radio Digital Communications \(ARDC\)](#), I have mostly written about ARDC's grantmaking activities and its potential as an agent of change in Amateur Radio. But behind the scenes, the original purpose of ARDC, managing and improving the [44.x.x.x Class A IPv4 address space](#) has continued. ARDC's (volunteer) [Technical Advisory Committee \(TAC\)](#) has been hard at work for months working on plans to expand and improve Net44.

On July 27, 2021, the TAC offered their proposal - [ARDC 44.128/10 Allocation Proposal](#) (PDF) on [ARDC's Net44 mailing list](#). Abstract:

This proposal reserves the prefix of 44.128/10 primarily for radio networks and amateur radio use and not to be announced or routed on the Internet by end-users.

I offer my kudos to Antonios Chariton SV2OIY for his role as designated representative of the TAC during the discussions of the TAC's proposal on the Net44 list. SV2OIY did the TAC proud in his postings on Net44. To view the archives, you have to be a member of the list.

I confess that I don't have enough hardcore networking background to summarize the TAC's proposal, thus I defer to the linked document; those who do have networking backgrounds can dive deep. The TAC's proposal made sense to me. I was especially in favor of a proposal to create "Net44 Points of Presence (POPs)" that would allow much easier access into the Net44 address space for networks within Net44 that aren't accessible from the Internet, but only allow access to other Net44 users.

The TAC's proposal wasn't well received on the Net44 list by some vocal participants on the list. As with the details of the TAC's proposal, I won't attempt to summarize the discussion on the Net44 list - it grew too complex, with too much external context about how some Net44 networks operate, for me to fully grasp. On August 2nd, 2021, after six days of "intense discussion", Rosy Wolfe, Executive Director of ARDC wrote :

Subject: On Allocations, PoPs, and Proposals

I, along with the board and staff, have been reading these messages. First of all, I want you all to know that YOU ARE HEARD. The point of having the TAC put out a proposal was to get feedback before adoption. It turns out that a significant part of the feedback is negative. I think that this proposal needs more work and adjustment before we can consider implementing it. The board and I want to see consensus on the main points of a proposal among the major schools of thought on this mailing list. That said, it's important to remember that the people on this list are not the only people using the AMRPnet. We have a complex task on our hands to reach as many of those people as possible as we evolve proposals toward consensus.

Several board members have suggested that it's hard to find consensus on solutions until we have a consensus on what problem(s) the solutions are trying to solve. We have a tangle of issues like the complexity of IPIP tunnels, to BGP routing, to address space sparseness, to low performance.

With this in mind, what problems with the AMPRnet do you think we should be trying to solve first?

One thing we haven't communicated well before, is that we are actively discussing budget and infrastructure for a “backbone” network of PoPs (Points of Presence) of the 44net on various continents, to make it easier for hams to connect to the AMPRnet with minimal effort and higher performance. If you have ideas about how you would like to see this happen, feel free to share here on the mailing list. I know that there's at least one alternative proposal on the way.

There's obviously more discussion to be had, but for now, please rest assured that no changes are going to be made without more input from you and others using the AMPRnet.

I also want to thank the TAC for their work up to this point. They have dedicated hundreds of hours to come up with this proposal. Even if its release has cause some heated discussion, it's critical that these discussions happen. They will help all of us come up with the best solution for how to most effectively organize our network for the future.

If you're interested in making use of Amateur Radio's worldwide IPv4 address space, and have the technical background to contribute to the discussion, I encourage you to subscribe to the [Net44 list](#) and participate there. Note that new subscriptions to the Net44 list *are moderated*, and that the intense discussion phase with the principals of the TAC is on hiatus for an indefinite period to give them a break.

Disclaimer - In 2021, I'm a volunteer member of the ARDC Grants Advisory Committee, and have some interaction with the ARDC Technical Advisory Committee. The opinions expressed above about the TAC Proposal are solely my own, and do not reflect the opinions of Amateur Radio Digital Communications.

Amateur Radio In Orbit

Amateur Radio on the International Space Station (ARISS)

By Steve Stroh

I'll blame W6MRR (see this issue's Feedback Loop below) for this article being brief.

Briefly, [ARISS](#) is as pure-play Amateur Radio goodness as it gets. ARISS is one of my primary bragging points of being an Amateur Radio Operator - “*We even have an Amateur Radio Station on the International Space Station!*”. It's a worthy project in itself to have an Amateur Radio station (two, actually) onboard the International Space Station (ISS). But beyond the cool factor / bragging rights of Amateur Radio Operators worldwide of Amateur Radio having a formal place on the ISS, is what they *do* with that Amateur Radio station(s) - *inspire kids to become interested in space, and tech, and science, and orbital mechanics, and radio, and... and... (the list is endless)*. ARISS inspires kids with the simple expedient of letting kids talk directly to astronauts on the ISS via Amateur Radio.

ARISS needs support, especially financial support for their ongoing operations. In the US, ARISS was formerly a joint project and semi-sponsored by ARRL and AMSAT-NA. In June,

2020 ARISS-USA [became an independent entity](#), which enabled it to directly accept financial gifts.

You'd think (I did...) that NASA and other governments participating in the ISS would "sponsor" the Amateur Radio station(s) on the ISS. Sad truth is, they don't. All ARISS is privately funded via [donations](#). Even the astronauts donate their recreation time to talk to the kids.

I can't think of a single better project to help promote Amateur Radio to the coming generations - ARISS is... just... cool! Please consider becoming a donor to ARISS.

If your Amateur Radio Organization wants to consider putting together an ARISS Ground Station to engage kids about space, communications, and all things Science, Technology, Engineering and Math (STEM), ARDC grants are available, like [Milton J. Rubenstein Museum of Science & Technology \(MOST\)](#), [OH-KY-IN Amateur Radio Society](#), and the [Bridgerland Amateur Radio Club](#) have all done in 2021.

Unfair Advantage - The CoCo Lives!

As Editor of Zero Retries, I'll occasionally take unfair advantage of that position to mention something that has nothing to do with Amateur Radio, but is within my personal range of interests, in hopes of connecting with others who share that interest as well as Advanced Amateur Radio. I'll try not to abuse it too much.

My Unfair Advantage this time is my nostalgia for the **Radio Shack Color Computer**. The CoCo was my first *real* computer. It had the advanced (for the time) Motorola 6809 processor, and the advent of the CoCo 3 enabled as much as 512k of RAM and OS-9, a multitasking, multiuser operating system *for the CoCo!* I *thought* the CoCo was dead and gone, until a couple of years ago when I stumbled, Alice-down-the-rabbit-hole like into the ongoing CoCo Community. Until that moment, I had no idea that the active and passionate CoCo Community existed! The linchpin of the *CoCo Forever!* movement is the [Glenside Color Computer Club](#), and its sponsorship of the (annual) [29th Annual "Last" Chicago CoCoFEST! 2021](#). A few more CoCo links:

- [The CoCo Crew Podcast](#) - 73 monthly podcasts and going strong! I'm a fan of these guys, and their enthusiasm was *the* reason I attended CoCoFest 2018.
- [Color Computer Archive](#) and [TRS-80 CoCo Wiki](#) - Includes all the CoCo Magazines, and a lot of software.
- [Cloud-9](#) can almost always repair a dead CoCo and peripherals.
- [NitrOS-9](#) is an amazing open source implementation of Microware's OS-9 for the CoCo that can take advantage of a 6309 processor upgrade and 512K of RAM.
- [DriveWire](#) on the CoCo and a host computer enables the CoCo's built-in serial port to

operate at 57,600 bps and the host computer is effectively used as a floppy disk.

- [The CoCo Collector](#) (YouTube). Watching this makes me feel better about my CoCo nostalgia. There are others who have it much worse than I do.
- [CoCo: The Colorful History of Tandy's Underdog Computer](#) (book, Amazon link) This very nice book answered all my lingering questions about the origins, and the overall arc of the CoCo.

Besides all my Amateur Radio experimentation planned for this summer, it's also a strong goal to unbox and set up my "new" CoCo 3 with a [6309 processor](#), 512K RAM, SSD "disk", etc. Maybe even put it on Packet Radio! (There are those four KPC-2400s that aren't doing anything...)

Request to Send

In writing Zero Retries 0004 - VARA FM Deep Dive, I felt then that I had said all that I could about VARA FM until I get some hands-on experience with it. But you readers had more than a bit of thought-provoking and informative feedback. Thus Zero Retries 0006 next week will be a **VARA FM Deep Dive, Part 2**.

One recurring feedback about Zero Retries is that I offer up a lot of ideas, concepts, projects, activities about Advanced Amateur Radio, and that "firehose" of information can be a little overwhelming. Fair point - I acknowledge that. I try to include links to reference material, and per the instrumentation that Substack provides, those links are being used. I'm not trying to be snobbish or elitist, but Zero Retries (at least, as I can currently execute it) isn't for everybody. ZR isn't even going to be for every techie interested in Amateur Radio.

In this issue, you have a great article from Steve Lampereur KB9MWR. And you have Substack as a platform enforcing limits on how long an (email) issue of Zero Retries can be (again, a good thing for you email readers). If I dive really deep on a topic, such as I did last week in Zero Retries 0004 on VARA FM, it kind of crowds out all the other good stuff. So, it's a balance.

Please keep writing and providing feedback and ideas. I'm in receive mode.

de N8GNJ

Feedback Loop

*I've had limited success in getting people to agree to be quoted in Feedback Loop. **The entire point of Zero Retries is increasing the perception that "Amateur Radio has Interesting Technical Activity"**. Thus, I have a new policy for Feedback Loop: I'll feature the most interesting exchanges I have with readers and paraphrase their feedback without attribution, unless in your feedback you proactively agree to be quoted verbatim with your name. I think that strikes a balance of getting good ideas out in the open, but preserves reader's identities. If you put your feedback in public like ATMILO did, I'll probably quote you.*

[Redditor “ATM1LO”](#)

The first issue, where he lays out the purpose and motivation behind it, is very worthwhile discussion. This is very much in my wheelhouse; I thought it might be in some of yours as well. The planned publication schedule is weekly on Friday afternoons.

The [comments](#) are pretty entertaining.

Steve Lampereur KB9MWR on Zero Retries 0003:

Regarding “43 years of issues, and over 64,000 pages” of [73 Magazine available online at the Internet Archive](#), there are two online indexes that can quickly find specific info within that archive.

Tom Green W1SDM was the first to do just what I suggested in my flat HTML index with his [73 Magazine - Table of Contents Database](#).

Then Mike Yancey KF5HUA spun that off and made [an even better version with links to each article](#).

Martin Rothfield W6MRR on on Zero Retries 0003:

(The following is edited and condensed; W6MRR and I had several email exchanges.)

I want to introduce myself to you. I am an avid amateur radio balloonist and am busy getting ready for my next [pico](#) flight.

This just came across my [radar](#). I have been thinking about another WSPR system, other than the type 2 or 3 messages currently for ballooning. I think the best solution is a different signal on a different set of frequencies. I know just a couple of hundred Hz is a big ask, but WSPR is really going to get busy when propagation heats up.

German [hams](#) have implemented and started development of experimental chirp spread spectrum signals. LoRa™ is a trademarked name so until someone comes up with something else more sexy, it's “CSS”. American hams can use these signals over the air on Part 15 frequencies. I'm not a lawyer but it seems like the [Part 97](#) requirement for “Maintain a record, convertible to the original information (voice, text, image, etc.) of all spread spectrum communications transmitted” is doable but cumbersome for most hams. Not so easy for ballooning.

Spread spectrum radio transmission uses more bandwidth than required for a number of reasons. I've used COTS 0.1 W SX127x based radio under Part 15 for balloon tracking. APRS is preferred as a primary tracker because of its enormous network but I find that for close-in location, the CSS signal vastly outperforms a 0.5 W APRS signal. It has interesting spectrum media access properties. Part 15 CSS radios don't interfere with other same band Part 15 devices as the low power signal is spread over a much wider bandwidth. This is a very different approach to media access from conventional ham radio and I don't think it has existed in the ham relm, other than AMRAD and TAPR testing. The COTS CSS product has a bandwidth as great as 0.5 MHz. At microwave frequencies this isn't a problem but

would increase noise in the lower bands. At sufficient power a wideband signal would interfere in the VHF/UHF bands. Because of the FM capture effect, a low power CSS signal may not be that much of a problem on the portion of those bands. Frequency hop, CDMA and CSS have all existed for decades but haven't been implemented until now due to cheap, inexpensive computing. Maybe it's time for a different approach to amateur radio spectrum access.

Re: WSJT - I made a QSO from my QTH to somewhere in WA with 7 uW on 20 m with a hexbeam using JT65. Why did JT65 go away?

Re: HaD - Elliot Williams, KB3RVQ and I got into ham radio flying balloons together at HacDC long ago. Elliot has moved to Germany and is Hackaday Managing Editor, Discoverer, Explainer, and Writer.

Thanks for writing! Feedback is what keeps me going on Zero Retries. You might want to look at this [YouTube video](#). WB6CXC proposes using a modified FT8 because of the limitations on telemetry issues as you're encountering. Also, you might want to check out [Altus Metrum](#). Though their products are designed for rocketry, it seems to me they're also usable (but perhaps overkill) for balloons. Best of all, it's all open source, including the hardware designs.

No one posits that APRS using 1200 bps AFSK AX.25... is optimum, or even a *good* standard. But it's widely adopted, supported, understood, and receiving stations are ubiquitous. Thus it's the preferred choice for tracking balloons with a distributed team that you have to provide equipment for - 144.39 MHz, a simple audio interface, and Dire Wolf software on a laptop and you have an adequate receiving station. LoRa is being increasingly used for telemetry from balloons, and even research satellites. My suggestion is not to dance around LoRa's technology and just embrace using actual LoRa. The situation about 433 MHz in the US is murky at best, inconsistent at worst. License-exempt operation for very low power, intermittent operation is allowed (think car key fobs) is allowed, but continuous operation at power levels that allow for operation more than a few feet away, are not. Over the past decade, a flood of 433 MHz communication devices, such as LoRa, have been available in the US with no "sanction" by the FCC, mostly because the ARRL has chosen to turn a blind eye to their import, sale, and usage. It's actually helped Amateur Radio a bit as there are starting to be some Amateur Radio implementations of LoRa (mostly, higher power).

I'm working with a friend on an article for Zero Retries about using LoRa.

It seems to me that the requirement for "Maintain a record..." is only applicable if the modulation / encoding method is unique; IE you invented it out of whole cloth like TARPEN did with their [Improved Layer 2 Protocol \(IL2P\)](#). IE, if you don't disclose it, there's no reasonable way to convert the transmission to the original information. But, if you use LoRa, I don't think that's necessary because the chipsets that are necessary to decode LoRa transmissions are readily and inexpensively available. It's the data equivalent of the use of the DVSI voice codec that's the core technology of Digital Voice systems like P25, D-Star, DMR, and System Fusion. The DVSI chips are readily and inexpensively available, so it's not much of an issue if you want to decode P25, D-Star, DMR, or System Fusion.

I hadn't seen the WSPR generation done on a Pi, just the FM broadcast band transmit hack from a long time ago. I have been doing pico ballooning, where everything is ultra lightweight and low power. Pi's tend to be a little power hungry. I homebrew with the JTEncode library on an ATmega so several weak signal modes are available. With improving propagation conditions I think all of the weak

signal frequencies will get congested. The only solution will be to spread out - that will be interesting.

I always thought that the 433 MHz parts fell under ISM rules, so not even a ham license is needed for the chips I'm using. I just don't want to see it get set in stone in Part 97 land as a proprietary standard. There could be an open ham CSS system. I'm really interested in introducing the spread spectrum to ham radio. AMRAD did a CDMA demonstration prototype. I think FHSS would be more noticeable as an interference source - especially at those power levels. I think the best way to deploy deserves study.

I wasn't suggesting the use of RPi for balloon flights, but rather the interesting hack of using FT8 instead of 1200 bps AFSK on a 25 kHz or so channel. Agreed that Spread Spectrum in Amateur Radio is a good thing.

Frequency Hopping Spread Spectrum (FHSS)

My limited experience with FHSS is that with the minimal dwell time per channel, and mostly high power analog devices in use such as FM, DMR, repeaters, etc. in most of the VHF / UHF bands, it's my guess (but only that, a guess) that FHSS won't be noticed. Doubly so now that repeaters have become much quieter.

Again, THE way to conduct an experiment that you can't contort into at least loose compliance with the current Part 97 rules, is to request a [Special Temporary Authority \(STA\)](#) or a [Part 5 Experimental License](#). Such formal experimentation *is* being done in Amateur Radio - here's the [latest example](#).

The pi RF transmit hack is still cool in my book. I admire WB6CXC's gumption for taking on the FT8 FEC. I used to do error coding work and it still makes my brain hurt.

Despite the fact I was born and raised in DC, I'm not a lawyer and accept whatever legal status you suggest applies to LoRa. AMRAD did obtain a STA when they did their spread spectrum work, so I am familiar with that. I'm really glad to hear of hams doing experimental work and possibly opening up spectrum. There is someone in my circle doing LoRa sat stuff - I need to look into that.

I'd like to see what spread spectrum systems would make the most sense in different bands. Besides not kechunking repeaters, there are a variety of other performance measures. I wonder if the ARDC could create a platform to help deploy this technology. I am really rusty on my communications technology, which is part of my motivation for getting into ham. IIRC there are distinct Eb/No performance advantages between systems. Also IIRC, FHSS is mostly an anti-jam mechanism more than a multiple access system. I believe CDMA and CSS systems have much better spectrum efficiency.

I was a big fan of [AMRAD](#) back in the day. AMRAD was (is?) a wild bunch of Amateur Radio uber-techies! I especially enjoyed their research on "Slow Fourier Transforms".

FHSS in its earliest use in the US military was as a robust (anti-jamming) system. It was also used as a Part 15 modulation, and was actually a modulation option in the very first version of

802.11, co-equal with DSSS (and Infrared). FHSS is the technology used in Bluetooth, and robust systems such as [Freewave Technologies](#) where reliability is more important than maximum possible speeds.

I've long been a proponent of Frequency Hopping Spread Spectrum (FHSS) in Amateur Radio. I think that FHSS has two key advantages in Amateur Radio - it's compatible with existing Amateur Radio usage as an underlay, and it's robust and would survive being interfered with. The fact that 420-450 MHz is vastly unused encourages me that FHSS would be a perfect mode there, and perhaps even 144-148 MHz and 222-225 MHz. People... simply... won't... notice.

I *think* FHSS would be pretty “easy” to implement now that we have inexpensive RF chipsets. The trick is to make the chipset switch frequencies fast enough and some kind of sync mechanism (probably easy now that we have GPS with 1pps outputs).

Thus my advocacy of GNU Radio and GNU Radio Companion (training wheels) to enable those of us who'd like to see such a mode to at least have the means to attempt FHSS without trying to create such a system from scratch. I keep hoping for some brave, small company - the 2021 equivalent of PacComm to come onto the scene with a FHSS radio with reasonable power - say 25 watts, for 420-450 MHz. I think it would be a huge hit.

Closing The Channel

If you're enjoying Zero Retries, please tell your friends and co-conspirators. For the immediate future, Zero Retries will remain an experiment in progress. Feedback is easy if you're reading Zero Retries in email - just hit Reply and I'll get your email. I'm especially interested in content ideas about things that you'd like to see discussed in Zero Retries. If you know of “Zero Retries Interesting” projects, groups, activities, etc. please let me know. I do reply to every Zero Retries email I receive.

Email issues of Zero Retries are “instrumented” by [Substack](#) to gather basic statistics about opens, clicking links, etc. There is no “text only, no instrumentation” version of Zero Retries available. I don't use such information in any way other than (in the absence of much feedback) getting some satisfaction that the data shows that people actually do read Zero Retries.

All previous issues of Zero Retries are available without restriction (no paywalls). For some background on Zero Retries, Issue 0000 was The Introduction Issue.

Contributors this issue:

- Steve Lampereur KB9MWR - Modernizing Amateur Radio Regulations
- Boisy Pietre KF5HEL - Inspiration for this month's “Unfair Advantage” discussion (CoCo).
- Martin Rothfield W6MRR - Stimulating exchange of emails detailed in Feedback Loop

Thanks for reading!

Steve Stroh N8GNJ
Bellingham, Washington, USA
2021-08-13

If you'd like to reuse an article in this issue, for example for club or other newsletters, just ask. Please provide credit for the content to me and any other authors.
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Below is a much more complete "footer" that has evolved over 30+ issues of ZR.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, here are some pointers:

- **Ham Radio for Dummies** by Ward Silver N0AX is a great overview of Amateur Radio. N0AX is a gifted writer and HRFD is now in its [4th edition](#).
- My two favorite **YouTube** channels for a good overview of Amateur Radio are [AmateurLogic.TV](#). and [Ham Nation](#) (part of Ham Radio Crash Course). These folks just seem to have so much fun!
- [Radio Amateur Training Planning and Activities Committee \(RATPAC\)](#) offers weekly presentations on general Amateur Radio topics (Wednesdays) and emergency communications in Amateur Radio (Thursdays).
- Dan Romanchik KB6NU offers a free **No-Nonsense Study Guide** for the [Technician test](#) (PDF).
- [HamExam.org Amateur Radio Practice Exams](#) offers good **Flash Card and Practice Exams**.
- When you're ready to take an **Amateur Radio examination** (Tech, General, or Extra), W1MX - The MIT Amateur Radio Society offers [remote exams](#), free for students and youngsters. *There are apparently [many other remote exam options](#).*

Bonus - with an Amateur Radio license, you'll be [more attractive on dates](#) 😊

Closing the Channel

- In its mission to grow Amateur Radio and make it more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex!
- My ongoing Thanks to Tina Stroh KD7WSF for, well, *everything* and Bill Vodall W7NWP as *Zero Retries Instigator in Chief*.

- My ongoing Thanks to pseudostaffers [Dan Romanchik KB6NU](#) and [Jeff Davis KE9V](#) for continuing to spot, and write about “Zero Retries Interesting” type items, on their respective blogs, from Amateur Radio and beyond, that I don’t spot on my own.
- [Southgate Amateur Radio News](#) consistently surfaces “Zero Retries Interesting” stories.
- The [Substack email publishing platform](#) makes Zero Retries possible. I recommend it for publishing newsletters.

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All previous issues of Zero Retries are available without restriction (no paywalls). For some background, Zero Retries 0000 was the **Introduction Issue**. Zero Retries 0026 and Zero Retries 0027 were a **2021 Year End Review** of Zero Retries.

More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!

Steve Stroh N8GNJ (He / Him)

These bits were handcrafted in beautiful Bellingham, Washington, USA

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